

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants	Rajagopalan et al.
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Title	NOVEL AROMATIC AZIDES FOR TYPE I PHOTOTHERAPY
Attorney Docket No.	1486.1 H US (073979.68)

October 14, 2010

DECLARATION OF RAGHAVAN RAJAGOPALAN, Ph.D. UNDER 37 C.F.R. §1.132

I, Raghavan Rajagopalan, declare as follows:

1. I am an inventor of the referenced application and am employed by its assignee. I hold a Ph.D. in Organic Chemistry from Columbia University, and have 27 years of experience in the synthesis and use of compounds for medical diagnosis and therapy, which is the subject of this application. I am also a registered U.S. Patent Agent. My curriculum vitae is attached.
2. A person skilled in the art would recognize that the amendments in the Supplemental Amendment correct a typographical error that was made without deceptive intent and do not constitute new matter.
3. The amendment corrects one embodiment of a linker portion L of the claimed bioconjugate compound. The unamended claim recites a linker L as $-(CH_2)_6CO_2-$. This is incorrect, and the skilled person would recognize it as incorrect because the bioconjugate resulting from such an arrangement of atoms in this composition is O-alkylhydroxamic acid, i.e., $-(CH_2)_6CO_2NH-$, rather than an amide $-(CH_2)_6CONH-$, which is a commonly used linker. A person skilled in the art would recognize that a typical bioconjugate will not comprise O-alkylhydroxamic acids, because they are both difficult to synthesize, and because they are unstable, and hence would not be a suitable linker. A person skilled in the art would recognize that a suitable linker would include amides, esters, carbamates, ureas, or thioureas. The correction of the linker to $-(CH_2)_6CO-$ results in the formation of an amide bond, which is generally stable to hydrolysis under physiological pH.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both, under § 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the subject application or any patent issued thereon.

Date: October 14, 2010

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SUMMARY OF PROFESSIONAL EXPERIENCE

Innovative medicinal chemist with 26 years of industrial research experience covering diagnostic and therapeutic pharmaceuticals in oncology, neurology, cardiology, and inflammation. Registered Patent agent with over 16 years of experience in drafting and prosecuting pharmaceutical and chemical patents.

- Pioneering work in the discovery and development of optical dynamic renal function monitoring agents.
- Pioneering work in the discovery of Type 1 phototherapeutic agents.
- Pioneering work in the discovery of integrated bifunctional systems.
- 82 Issued patents in diagnostic and therapeutic pharmaceuticals.
- 38 Publications and presentations covering pure and applied organic chemistry.
- 9 Years of industrial supervisory experience in organic/medicinal chemistry.
- 6 Years of teaching and mentoring graduate and undergraduate students in organic synthesis.
- 5 Years of experience in successfully obtaining SBIR grants.
- Registered Patent Agent with United States Patent & Trademark Office.

EDUCATION

- *Doctor of Philosophy* **Organic Chemistry.** Columbia University, New York, NY. 1980.
- *Bachelor of Science* **Chemistry.** State University of New York at Stony Brook, Stony Brook, NY. 1975.
- *Graduate Certification* **Applied Mathematics.** Washington University, St. Louis, MO. 1989.

INDUSTRIAL RESEARCH

COVIDIEN PHARMACEUTICALS, ST. LOUIS, MO.

Technical Fellow

1/2010 – Present

- Providing technical leadership and strategic direction for cancer phototherapy program.
- Supervising technical staff in all phototherapy projects.
- Proposing novel ideas, and assisting in all intellectual property activities.

COVIDIEN, ST. LOUIS, MO. IMAGING SOLUTIONS R&D.

Principal Research Scientist

7/2007 – 12/2009

- Provided technical leadership and strategic direction for the Biophotonics team for new product development in optical imaging, organ function monitoring, and phototherapy.
- Submitted new invention disclosures and assisting in drafting prosecution of Biophotonics patent applications.

TYCOHEALTHCARE/MALLINCKRODT INC., ST. LOUIS, MO. IMAGING R&D. (PART TIME)

Principal Research Scientist

1/2004 – 7/2007

- Provided strategic direction for the biomedical optics team for new product development.
- Conducted prior art search, writing patent applications, conducting and patent analysis for all Imaging R&D.
- Designed and synthesized novel agents for optical imaging, organ function monitoring, and phototherapy.

DAYA DRUG DISCOVERIES, INC., BEACHWOOD, OH. DISCOVERY MEDICINAL CHEMISTRY (PART TIME).

Director of Research

6/2003 – 1/2007

- Provided strategic direction for the discovery of novel HIV-1 integrase inhibitors and anti-cancer agents.
- Successfully obtained several SBIR grants from National Institutes of Health and Department of Energy.
- Supervised technical staff and provided administrative support, and drafted and prosecuted patent applications.

RICERCA, LLC., CONCORD, OH. DISCOVERY MEDICINAL CHEMISTRY R&D.

Research Fellow

9/2002 – 5/2003

- As a project leader, designed and developed novel antiestrogens for the treatment of breast cancer.
- Drafted patent applications. Provided patent advice to R&D staff. Conducted prior art searches.

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GLIATECH INC., BEACHWOOD, OH. DISCOVERY MEDICINAL CHEMISTRY R&D.

Senior Principal Scientist

2/2001 – 8/2002

- Supervised technical staff and provided administrative support for the chemistry department.
- Provided strategic research direction for the development for novel antipsychotics.
- Provided strategic direction for the development of CNS drugs for the treatment of obesity and cognitive disorders.
- Submitted and obtained SBIR grant pertaining to novel Gly-T1-based antipsychotics.
- Prepared composition of matter and process patent applications pertaining to CNS drugs.
- Provided patent advice to R&D staff. Conducted prior art search and patent analysis.

MALLINCKRODT INC., ST. LOUIS, MO. SCIENCE AND TECHNOLOGY. MEDICAL IMAGING R&D.

Senior Research Associate

2/1998 – 11/2000

- Provided strategic direction for the biomedical optics team for new product development.
- Established patent policies for R&D and advised technical staff on patentability issues.
- Prepared patent applications for Imaging R&D. Conducted prior art search and patent analysis.
- Designed and synthesized novel agents for optical imaging, organ function monitoring, and phototherapy.

Research Associate

2/1992 – 2/1998

- Designed and synthesized steroid mimics for diagnosis/therapy of prostate and breast tumors.
- Developed efficient GMP process for a novel myocardial perfusion agent that led to FDA submission.
- Designed and synthesized diagnostic/therapeutic bioconjugates for neuroendocrine tumors.
- Prepared patent applications for Imaging R&D. Conducted prior art search and patent analysis.

Senior Research Chemist

2/1988 – 2/1992

- Designed and synthesized pyridine based morphine mimics for assessing neurodegenerative diseases.
- Designed and synthesized novel metal complexes for magnetic resonance imaging.
- Developed efficient GMP process for novel pain palliation agent that led to FDA submission.
- Designed and synthesized novel ligands for technetium based myocardial and brain perfusion agents.
- Prepared patent applications for Imaging R&D. Conducted prior art search and patent analysis.

Research Chemist

2/1984 – 2/1988

- Developed efficient GMP process for novel renal agent that led to FDA submission.
- Designed and synthesized novel bifunctional chelates for site-selective conjugation to tumor specific antibodies.
- Developed anti-idiotypic internal image antibodies for imaging myocardial digoxin receptors.

JOHNSON & JOHNSON, ORTHO DIAGNOSTIC SYSTEMS INC., RARITAN, NJ. IMMUNOCHEMISTRY.

Research Scientist

1/1983 – 2/1984

- Development of in vitro fluorescent immunochemical detection method for counting T-cells.

ACADEMIC RESEARCH

COLUMBIA UNIVERSITY, COLLEGE OF PHYSICIANS AND SURGEONS, NEW YORK, NY.

Post Doctoral Research. Department of Microbiology. Research Focus, Immunology/Immunochimistry. 8/1980 – 12/1982

- Immunochemical assessment of DNA damage and repair caused by ionizing radiation.
- Development of internal image anti-receptor antibodies against steroid and sodium channel receptors.

COLUMBIA UNIVERSITY, GRADUATE SCHOOL OF ARTS AND SCIENCES, NEW YORK, NY.

Graduate Research. Department of Chemistry. Research Focus, Biomimetic Chemistry.

9/1975 – 7/1980

- Investigated the effect of multiple coordination on the regioselectivity of reactions in flexible molecules.

Raghavan Rajagopalan

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STATE UNIVERSITY OF NEW YORK AT STONY BROOK, STONY BROOK, NY.

Undergraduate Research. Department of Chemistry. Research Focus, New Synthetic Methods.

3/1974 – 8/1975

- Synthesis of Thermorubin antibiotic. Developed new method for the construction of xanthenes.

PUBLICATIONS

1. Chinen, L.K., Galen, K.P., Kuan, K.T., Dyszlewski, M.E., Ozaki, H., Sawai, H., Pandurangi, R.S., Jacobs, F.G., Dorshow, R.B., and Rajagopalan, R. *Fluorescence-Enhanced Europium Diethylene Triamine Pentaacetic (DTPA) Complexes for the Assessment of Renal Function*. Journal of Medicinal Chemistry, 2008, 51, 957-962.
2. Rajagopalan, R., Kuntz, R.R., Sharma, U., Volkert, W.A., Pandurangi, R.S. *Chemistry of Bifunctional Photoprobes: Development of Novel Rhenium Photoconjugates of Human Serum Albumin and Fab Fragments*. Journal of Organic Chemistry, 2002, 67, 6748-6757.
3. Achilefu, S.A., Rajagopalan, R., Bugaj, J.E., Dorshow, R.B., and *Synthesis, In-vitro Receptor Binding, and In-vivo Evaluation of Fluorescein and Indocyanine Peptide Based Optical Contrast Agents*. Journal of Medicinal Chemistry, 2002, In Press.
4. Achilefu, S.A., Uetrecht, P., Bugaj, J.E., Dorshow, R.B., and Rajagopalan, R. *Novel Receptor-Targeted Fluorescent Contrast Agents for In Vivo Tumor Imaging*. Investigative Radiology, 2000, 401-408.
5. Rajagopalan, R., Uetrecht, P., Bugaj, J.E., Achilefu, S.A., and Dorshow, R.B. *Stabilization of the Optical Tracer Agent Indocyanine Green Using Noncovalent Interactions*. Photochemistry and Photobiology, 2000, 71(3), 347-350.
6. Rajagopalan, R., Bugaj, J.E., Dorshow, R.B., Venkatramani, C.J., Uetrecht, P., and Achilefu, S.A. *Polyionic fluorescent bioconjugates as tracer agents for continuous monitoring of renal function*. In Molecular Imaging: Reporters, Dyes, Markers, and Instrumentation. Proceedings of SPIE, 2000, 3924, 1-6.
7. Dorshow, R.B., Bugaj, J.E., Achilefu, S.A., Rajagopalan, R., and A.H. Combs. *Monitoring physiological function by detection of exogenous fluorescent contrast agents*. In Optical Diagnostics of Biological Fluids IV. Priezhev A. and Akasura T. Editors. Proceedings of SPIE, 1999, 3599, 2-8.
8. Rajagopalan, R., Grummon, G.D., Bugaj, J.E., Halleman, L.S., Webb, E.G., Marmion, M.E., Vanderheyden, J.L., and Srinivasan, A. *Preparation, Characterization, and Biological Evaluation of Technetium(V) and Rhenium(V) Complexes of Novel Heterocyclic Tetradentate NSS Ligands*. Bioconjugate Chemistry, 1997, 8, 407-415.
9. Grummon, G.D., Rajagopalan, R., Palenik, G.J., Koziol, A.E., and Nosco, D.L. *The Synthesis, Characterization, and Crystal Structures of Technetium (V)-Oxo Complexes Useful in Nuclear Medicine. 1. Complexes of Mercaptoacetylglutylglycylglycine (MAG3) and its Methyl Ester Derivative (MAG3-OMe)*. Inorganic Chemistry, 1995, 34, 1764-1772.
10. Geraldes, C.F.G.C., Urbano, A.M., Alpoim, M.C., Sherry, A.D., Kuan, K.T., Rajagopalan, R., Maton, F., and Muller, R.N. *Preparation, Physico-Chemical Characterization, and Relaxometry Studies of Various Gadolinium (III)-DTPA-Bis(Amide) Derivatives as Potential Magnetic Resonance Contrast Agents*. Magnetic Resonance Imaging, 1995, 13, 401-420.
11. White, D.H., Rajagopalan, R., Kuan, K.T., Lin, Y., Wallace, R.A., Rogic, M.M., Bosworth, M.E., Robbins, M.S., Ralston, W.H., Adams, M.D., and Dunn, T.J. *Synthesis and Characterization of Nonionic Paramagnetic Metal Complexes as potential Magnetic Resonance Imaging Agents*. Investigative Radiology, 1990, 25, S56-57.
12. Erlanger, B.F., Cleveland, W.L., Wasserman, N.H., Ku, H.H., Hill, B.L., Sarangarajan, Rajagopalan, R., Tsiilinos, E., Edelman, I.S., and Penn, A.S. *The Auto-Anti-Idiotypic Route to Anti-Receptor Antibodies*. Idiotypes. Reichlin, M. and Capra, J.D. Eds. Academic Press: New York, 1986.
13. Pillai, R.K.M., Naiksatam, P., Johnson, F., Rajagopalan, R., Watts, P.C., Cricchio, R., and Borras, S. *Thermorubin II: 1,3-Dihydroxy-9H-xanthenes. New Methods of Synthesis*. Journal of Organic Chemistry, 1986, 51, 717.
14. Cayanis, E., Rajagopalan, R., Cleveland, W.L., Edelman, I.S., and Erlanger, B.F. *Generation of Auto-anti-idiotypic Antibody that Binds to Glucocorticoid Receptor*. Journal of Biological Chemistry, 1986, 261, 5094.
15. Erlanger, B.F., Cleveland, W.L., Wasserman, N.H., Ku, H.H., Hill, B.L., Sarangarajan, Rajagopalan, R., Cayanis, E., Edelman, I.S., and Penn, A.S. *Auto-Anti-Idiotypic: A Basis for Autoimmunity and a Strategy for Anti-Receptor Antibodies*. Immunological Reviews, 1986, 23.
16. Rajagopalan, R., Melamed, R.J., Laspi, M.F., Erlanger, B.F., and Wallace, S.S. *Properties of Antibodies to Thymine Glycol, a Product of the Radiolysis of DNA*. Radiation Research, 1984, 97, 499.
17. Kleyman, T.R., Rajagopalan, R., Cragoe, E.J., Erlanger, B.F., and Qais Al-Awqati. *New Amiloride Analogue as Hapten to raise Anti-Amiloride Antibodies*. Journal of General Physiology, 1986, c165.

18. Erlanger, B.F., Miller, O.J., **Rajagopalan, R.**, and Wallace S.S. *Immunological Approaches for the Detection of DNA Modified by Environmental Agents. Application of Biological Markers to Carcinogen Testing.* Milman, H.A., Ed., pp. 325. Plenum Press: 1983.
19. Breslow, R., **Rajagopalan, R.**, Schwarz, J. *Selective Functionalization of Doubly Coordinated Flexible Chains.* Journal of the American Chemical Society, 1981, 2905.
20. **Rajagopalan, R.** *The Double Interaction in Remote Functionalization Reactions.* Ph.D. Thesis, 1980, Columbia University, New York.

PRESENTATIONS

1. **Rajagopalan, R.**, Karwa, A., Lusiak, P., Srivastava, K., Poreddy, A., Pandurangi, R.S., Galen, K.P., Neumann, W.L., Cantrell, G.L., and Dorshow, R.B. *Novel Type 1 Photosensitizers: Viability of Leukemia Cells Exposed to Reactive Intermediates Generated In Situ by In Vitro Photofragmentation.* Abstract, International Photodynamic Association, Settle, WA. June 2009.
2. Chinen, L.K., Galen, K.P., Kuan, K.T., Dyszlewski, M.E., Ozaki, H., Sawai, H., Pandurangi, R.S., Jacobs, F.G., Dorshow, R.B., and **Rajagopalan, R.** *Fluorescence-Enhanced Europium Diethylene Triamine Pentaacetic (DTPA) Complexes for the Assessment of Renal Function.* Abstract, Society of Photo-Optical Instrumentation Engineers (SPIE), San Jose, CA. January 2008.
3. Dorshow, R.B., Asmalash, B., Chinen, L.K., Debreczeny, M.P., Fitch, R.M., Freskos, J.N., Galen, K.P., Gaston, K.R., Marzan, T.A., Poreddy, A.R., **Rajagopalan, R.**, Shieh, J.-J., and Neumann, W.L. *New Optical Probes for Continuous Monitoring of Renal Function.* Abstract, Society of Photo-Optical Instrumentation Engineers (SPIE), San Jose, CA. January 2008.
4. Jegede, O; Weber, J; **Rajagopalan, R.**; Wawro, W.J. Sr.; Babu, J.S.; Quinones-Mateu, M.E. Divalent metal ion chelating small molecules as novel HIV integrase inhibitors. XIV International HIV Drug Resistance Workshop, Quebec, Canada, June 2005: Basic Principles and Clinical Implications. Abstract 76, *Antiviral Therapy* 2005; 10:S83
5. Yates, S.L., Powlowski, G.P., Babu, J.S., **Rajagopalan, R.**, Wawro, W.J., and Tedford, C.E. *Inverse Agonists of the Histamine 3 Receptor as Appetite Suppressants.* Abstract, American Chemical Society San Jose, CA. March 2003.
6. **Rajagopalan, R.**, Bugaj, J.E., Achilefu, S.A., and Dorshow, R.B. *Novel Azide Bioconjugates as Type 1 Phototherapeutic Agents.* Abstract, Society of Photo-Optical Instrumentation Engineers (SPIE), San Jose, CA. January 2001.
7. **Rajagopalan, R.**, Uetrecht, P., Bugaj, J.E., Achilefu, S.A., and Dorshow, R.B. *Stabilization of the Optical Tracer Agent Indocyanine Green Using Noncovalent Interactions.* Abstract, Society of Photo-Optical Instrumentation Engineers (SPIE), San Jose, CA. January 2000.
8. **Rajagopalan, R.**, Bugaj, J.E., Dorshow, R.B., Venkatramani, C.J., Uetrecht, P., and Achilefu, S.A. *Polyionic Fluorescent Bioconjugates as Tracer Agents for Continuous Monitoring of Renal Function.* Abstract, Society of Photo-Optical Instrumentation Engineers (SPIE), San Jose, CA. January 2000.
9. Achilefu, S.A., Dorshow, R.B., Bugaj, J.E., and **Rajagopalan, R.** *Tumor Specific Fluorescent Contrast Agents.* Abstract, Society of Photo-Optical Instrumentation Engineers (SPIE), San Jose, CA. January 2000.
10. Dorshow, R.B., Bugaj, J.E., Achilefu, S.A., **Rajagopalan, R.**, and Combs, A.H. *Monitoring Physiological Function by Detection of Exogenous Fluorescent Contrast Agents.* Abstract, Society of Photo-Optical Instrumentation Engineers (SPIE), San Jose, CA. January 2000.
11. **Rajagopalan, R.**, Bugaj, J.E., Dorshow, R.B., Venkatramani, C.J., Uetrecht, P., and Achilefu, S.A. *Polyionic Fluorescent Bioconjugates as Tracer Agents for Continuous Monitoring of Renal Function.* Abstract, Optical Society of America (OSA), Baltimore, M.D. October 1998.
12. **Rajagopalan, R.**, Grummon, G.D., Bugaj, J.E., Halleman, L.S., Webb, E.G., Marmion, M.E., Vanderheyden, J.L., and Srinivasan, A. *Preparation, Characterization, and Biological Evaluation of Technetium (V) and Rhenium (V) Complexes of Novel Heterocyclic Tetradentate N3S Ligands.* Abstract, The Indo-American Society of Nuclear Medicine. December, 1996.

13. **Rajagopalan, R., Schmidt, M.A., Grummon, G.D., Marmion, M.E., La Fourniere, B., Vanderheyden, J.L., Deutsch, K.F., Dunn, T.J., and Srinivasan, A.** *Preparation and Unexpected Labelling Properties of Novel Nitrogen Heterocycle Based N3S Ligands.* Abstract, The Society of Nuclear Medicine. June, 1992.
14. **Nosco, D.L., Coveney, J., Weber, R., Rajagopalan, R., Verbruggen, A., and Bormans, G.** *99m-Tc Complexes of N3S Ligands; Labelling and Biodistribution Properties and Comparison to OIH.* Abstract, The Society of Nuclear Medicine. June, 1991.
15. **Neumann, W.L., Brodack, J.W., Rajagopalan, R., Rogic, M.M., Dunn, T.J., and Deutsch, E.** *Design and Synthesis of New Preorganized Hexadentate N2O2P2 Ligand Systems for Metal Based Radiopharmaceutical Applications.* Abstract, The Society of Nuclear Medicine. June, 1991.
16. **Nosco, D.L., Grummon, G.D., Rajagopalan, R., Wolfangel, R.G.** *Development of a Kit Formulation for 99m-Tc MAG3 of Very High Purity and Stability.* Abstract, The Society of Nuclear Medicine. June 1990.
17. **Ralston, W.H., Galen, K.P., Barco, S.J., DeLearie, L.A., Rajagopalan, R., Wallace, R.A., White, D.H., Periasamy, M.P., and Adams, M.D.** *Initial Evaluation of Gd(DTPA)-Bisamides as Potential Magnetic Resonance Contrast Agents.* Abstract, Society of Magnetic Resonance Imaging. August, 1990.
18. **White, D.H., Rajagopalan, R., Kuan, K.T., Lin, Y., Wallace, R.A., Rogic, M.M., Bosworth, M.E., Ralston, W.H., Hirth, W., Adams, M.D., and Dunn, T.J.** *Synthesis and Characterization of Nonionic Paramagnetic Metal Complexes as Potential Magnetic Resonance Contrast Agents.* Abstract, International Conference on Radiology. January, 1990.

PATENTS

1. **Achilefu, S.I., Rajagopalan, R., Dorshow, R.B., Bugaj, J.E., and Periasamy, M.P.** *Receptor-Avid Optical Contrast and Therapeutic Agents.* U.S. Patent 7 790 144, 2010.
2. **Achilefu, S.I., Rajagopalan, R., Dorshow, R.B., Bugaj, J.E., and Periasamy, M.P.** *Optical Diagnostic and Therapeutic Agents and Compositions.* U.S. Patent 7 787 194, 2010.
3. **Rajagopalan, R., Achilefu, S.I., Bugaj, J.E., and Dorshow, R.B.** *Dye-Sulfonates for Dual Phototherapy.* U.S. Patent 7 758 881, 2010.
4. **Rajagopalan, R., Dorshow, R.B., and Moore, D.A.** *Luminescent Metal Complexes for Monitoring Renal Function.* U.S. Patent 7 674 902, 2010.
5. **Achilefu, S.I., Rajagopalan, R., Dorshow, R.B., Bugaj, J.E., and Periasamy, M.P.** *Hydrophilic Light Absorbing Compositions for Determination of Physiological Function in Critically Ill Patients.* U.S. Patent 7 608 244, 2009.
6. **Achilefu, S.I., Rajagopalan, R., Dorshow, R.B., Bugaj, J.E., and Periasamy, M.P.** *Versatile Hydrophilic Dyes.* U.S. Patent 7 566 444, 2009.
7. **Achilefu, S.I., Rajagopalan, R., Dorshow, R.B., Bugaj, J.E., and Periasamy, M.P.** *Minimally Invasive Physiological Function Monitoring Agents.* U.S. Patent 7 556 797, 2009.
8. **Achilefu, S.I., Rajagopalan, R., Dorshow, R.B., Bugaj, J.E., and Periasamy, M.P.** *Tumor Targeted Optical Contrast Agents.* U.S. Patent 7 514 069, 2009.
9. **Achilefu, S.I., Dorshow, R.B., Rajagopalan, R., and Bugaj, J.E.** *Pathological Tissue Detection and Treatment Employing Targeted Benzindole Optical Agents.* U.S. Patent 7 510 700, 2009.
10. **Achilefu, S.I., Rajagopalan, R., Dorshow, R.B., Bugaj, J.E., and Periasamy, M.P.** *Receptor Avid Exogenous Optical Contrast and Therapeutic Agents.* U.S. Patent 7 504 087, 2009.
11. **Achilefu, S.I., Rajagopalan, R., Dorshow, R.B., Bugaj, J.E., and Periasamy, M.P.** *Hydrophilic Light Absorbing Compositions for Determination of Physiological Function in Critically Ill patients.* U.S. Patent 7 468 177, 2008.
12. **Achilefu, S.I., Rajagopalan, R., Dorshow, R.B., Bugaj, J.E., and Periasamy, M.P.** *Dyes for Organ Function Monitoring.* U.S. Patent 7 438 894, 2008.

13. **Rajagopalan, R., Bugaj, J.E., Achilefu, S.I., and Dorshow, R.B.** *Internal Image Antibodies for Optical Imaging and Therapy.* U.S. Patent 7 431 925, **2008.**
14. **Rajagopalan, R., Cantrell, G.L., Achilefu, S.I., Bugaj, J.E., and Dorshow, R.B.** *Aromatic Sulfenates for Type I Phototherapy.* U.S. Patent 7 427 657, **2008.**
15. **Rajagopalan, R., Achilefu, S.I., Bugaj, J.E., and Dorshow, R.B.** *Cyanine-Sulfenates for Dual Phototherapy.* U.S. Patent 7 351 807, **2008.**
16. **Rajagopalan, R., Achilefu, S.I., Bugaj, J.E., and Dorshow, R.B.** *Methods and Compositions for Dual Phototherapy.* U.S. Patent 7 303 926, **2007.**
17. **Achilefu, S.I., Rajagopalan, R., Dorshow, R.B., Bugaj, J.E., and Periasamy, M.P.** *Hydrophilic Light Absorbing Compositions for Determination of Physiological Function.* U.S. Patent 7 297 325, **2007.**
18. **Rajagopalan, R.** *Phosphorous Containing Steroid Mimics.* U.S. Patent 7 284 738, **2007.**
19. **Achilefu, S.I., Dorshow, R.B., Rajagopalan, R., and Bugaj, J.E.** *Pathological Tissue Detection and Treatment Employing Targeted Benzindole Optical Agents.* U.S. Patent 7 252 815, **2007.**
20. **Rajagopalan, R., Cantrell, G.L., Achilefu, S.I., Bugaj, J.E., and Dorshow, R.B.** *Aromatic Sulfenates for Type I Phototherapy.* U.S. Patent 7 235 685, **2007.**
21. **Rajagopalan, R., Achilefu, S.I., Bugaj, J.E., Dorshow, R.B., and Periasamy, M.P.** *Compounds for Dual Photodiagnosis and Therapy.* U.S. Patent 7 230 068, **2007.**
22. **Achilefu, S.I., Dorshow, R.B., Rajagopalan, R., and Bugaj, J.E.** *Pathological Tissue Detection and Treatment Employing Targeted Optical Agents.* U.S. Patent 7 201 892, **2007.**
23. **Achilefu, S.I., Rajagopalan, R., Dorshow, R.B., Bugaj, J.E., and Periasamy, M.P.** *Tumor Targeted Optical Contrast Agents.* U.S. Patent 7 175 181, **2007.**
24. **Achilefu, S.I., Rajagopalan, R., Dorshow, R.B., Bugaj, J.E., Jimenez, H.N., and Periasamy, M.P.** *Light Sensitive Compounds for Instant Determination of Organ Function.* U.S. Patent 7 175 831, **2007.**
25. **Achilefu, S.I., Dorshow, R.B., Rajagopalan, R., and Bugaj, J.E.** *Pathological Tissue Detection and Treatment Employing Targeted Benzindole Optical Agents.* U.S. Patent 7 128 896, **2007.**
26. **Achilefu, S.I., Rajagopalan, R., Dorshow, R.B., Bugaj, J.E.** *Hydrophilic Cyanine Dyes.* U.S. Patent 7 011 817, **2006.**
27. **Achilefu, S.I., Rajagopalan, R., Dorshow, R.B., Bugaj, J.E.** *Versatile Hydrophilic Dyes.* U.S. Patent 6 939 532, **2005.**
28. **Achilefu, S.I., Jimenez, H.N., Rajagopalan, R., Dorshow, R.B., Bugaj, J.E.** *Compounds as Dynamic Organ Function Monitoring Agents.* U.S. Patent 6 887 854, **2005.**
29. **Achilefu, S.I., Dorshow, R.B., Rajagopalan, R., and Bugaj, J.E.** *Pathological Tissue Detection and Treatment Employing Targeted Benzindole Optical Agents.* U.S. Patent 6 761 878, **2004.**
30. **Rajagopalan, R., Cantrell, G.L., Bugaj, J.E., Achilefu, S.I., and Dorshow, R.B.** *Azo Compounds for Type I Phototherapy.* U.S. Patent 6 747 151, **2004.**
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